and filled with a depot of provisions for the next year, such as pemmican, meat biscuit, sugar, peas and barley. They then returned to their winter quarters at Nanortalik, on the west coast.

Meanwhile, Nordenskjöld had been engaged also with the east coast problem, and his efforts were crowned with a marvelous success. Having performed his excursion over the inland-ice and had his ship sent on an exploring voyage as far as Cape York, he reached the east coast about the latitude of 65½° and discovered a harbor where he anchored. Of course his stay could only be for a short duration, but still he is the first explorer who penetrated from the sea to this coast.

EXPEDITIONS OF 1884.—In the spring of this year two expeditions set out for Greenland. The first consisted of Lieutenant Jensen with two scientific companions and was ordered to survey the district between 65° and 67° latitude. The other was led by Captain of the Navy C. O. E. Normann, an experienced traveler in Greenland, and an authority as regards Arctic questions in general. He commanded the man-of-war schooner *Tylla* ordered to inspect the fishing-banks in front of the trading districts and to continue the survey of the coast in connection with other explorations.

As regards the east coast explorers, a letter has arrived from the leader, dated the 17th of July, according to which they had reached the latitude of about 62°, having been as usual much impeded by ice. They hoped to reach a populous place called Angmagsalik, somewhat beyond 65° latitude, and to winter there.

On the Detection of Adulterations in Oils. By Prof. Oscar C. S. Carter, Central High School, Phila.

(*Read before the American Philosophical Society, March 20, 1885.*)

The chemical examination of oils is a very important though much neglected study. Important from the fact that the oils which command a high price in the market and are in general demand are frequently adulterated. The temptation to adulterate is great on account of the heavy increase in profit and because the adulterant is often very difficult of detection. The purchaser is always at the mercy of the oil merchant unless the oil be submitted to a chemical examination. "Our former Consul at Naples reported to the State Department that immense quantities of refined cotton seed oils are sent to Italy for the express purpose of sophisticating the

native olive oil, for the reason that it can be brought to Naples and sold at less than half the cost of producing pure olive oil." The cotton seed oil mixed with pure olive oil is exported to other countries. The price of fine salad oil is from three to four dollars per gallon, while cotton seed oil is worth from seventy to ninety cents per gallon. The oils commonly used to adulterate olive oil are colza oil, sesame oil and peanut oil. In the North of France poppy oil is used frequently because of its cheapness and neutral taste, and in Provence honey is used. In all probability glucose syrup has been tried. Linseed oil, the most important drying oil in the arts, so much used in varnishes and paints, is very often sophisticated. Even the seed from which the oil is made is mixed with other seeds. In India flaxseed is grown with mustard and rape. In Russia various proportions of hemp and linseed are sown together. Hemp seed yields an oil of an acrid odor, mild taste and yellow color, used in Russia for burning in lamps and making paints, varnishes and soap. The oils commonly mixed with linseed oil are niger, cotton seed, fish, rosin and coal oils. In this country lard is adulterated with palmnut and cocoanut oil, the latter is a white fat with the peculiar smell of the kernel. It was formerly made by grinding the kernel, boiling with water and subjecting the paste to a great pressure; a large quantity of milky juice is so obtained which is slowly boiled and the oil separates and is skimmed off. Twenty ordinary sized nuts yield about two quarts of oil. The strong taste of these oils is an objection, and may prevent their general use as adulterants and for the manufacture of oleomargarine. Lard oil which is obtained from lard is very valuable as a lubricant for machinery, and is also used for greasing wool in spinning. It is frequently adulterated with fish oils and cotton seed oils. Lard oil is worth one dollar and twenty cents per gallon, while cotton seed oil is worth about one-half as much.

The chemical analysis and detection of the adulterated oil is sometimes simple, but generally it is a difficult and trying task, especially when three or more oils have been mixed. The determination of the percentage of oil used to adulterate is out of the question and we must often be satisfied by simply proving that there has been a mixture without knowing the nature of it. But little work has been done on oils compared to the vast amount of research given to other subjects. Chemists have avoided the study and analysis of oils as difficult and uninteresting. We owe almost all we know to the labors of Chevreul and later to the researches of Prof. Allen and others. When oils are examined, chemical tests are the more important, but the physical tests are also very useful. At the present time we have not a characteristic test for each oil, as we have for each metal, that will distinguish it when mixed with other oils or that will identify it when alone.

When we examine an oil supposed to be adulterated, much can be accomplished by procuring a sample of perfectly pure oil and subjecting them both to the same tests and observing their behavior. A sample of lard oil supposed to be adulterated was received from a woolen manufac-

turer for examination. A specimen of perfectly pure lard oil was obtained and they were subjected to the same tests.

According to Professor Bechi, of Florence, the following test is reliable and delicate for detecting cotton seed oil in olive oil. The reagent is a one per cent solution of nitrate of silver in absolute alcohol. Place 5 c. c. of the suspected oil in a glass flask, add to it 25 c. c. of absolute alcohol and 5 c. c. of the test solution of nitrate of silver made as stated above. The flask is heated in a water bath at 84° C. (direct heat must not be used). If there be any cotton seed oil present, the mixture will begin to darken, the most minute quantity serving to discolor, and the tint assumed will depend upon the amount of cotton seed oil present. The test depends upon the fact that cotton seed oil will reduce nitrate of silver, but olive oil will not. This reduction is also caused by rape seed oil, but according to Bechi, pure olive oil will remain without discoloration under this test. While experimenting with the test I thought it might be of service in detecting cotton seed oil in lard oil; accordingly the sample of chemically pure lard oil was treated with absolute alchohol and nitrate of silver as directed and then heated; there was not the slightest discoloration of the pure lard oil; even on standing for two weeks it did not darken, thus proving it had no action upon the nitrate of silver. The lard oil obtained from the woolen manufacturer was then tested in the same manner; when it had been heated for a few minutes it began to darken and finally became quite black, thus proving that the lard oil was not pure but mixed with some other oil. I am not certain that the darkening is due to reduction; having made a series of experiments with salts of mercury, copper, and antimony and cotton seed oil to see if there would be any reduction I obtained no satisfactory results, and no reduction was noticed.

The elaidin test is sometimes very satisfactory, especially in detecting a mixture of a drying and non-drying oil and detecting adulteration of olive oil. This test depends upon the fact that olein and oleic acid in contact with peroxide of nitrogen yield a crystalline, solid, fatty body fusible at 32° C. to which Boudet has given the name elaidin. The nitrous vapors made by the action of nitric acid on copper are passed through the oil, or it may be shaken with a fresh solution of mercurous nitrate which has the property of retaining nitrous acid. Non-drying vegetable oils and most animal fats contain oleic acid. The following oils contain a high percentage of olein: olive, almond, rape, arachis (earth-nut), castor and the oils from lard and tallow. These oils form with nitrogen peroxide solid elaidin of a white or yellow color which in some cases is firm and resonant. The drying oils, such as linseed, hemp seed and poppy seed oils do not form solid elaidin with nitrous vapors but remain liquid for more than two days and become slightly colored. The elaidin test was applied to the adulterated lard oil and to the pure lard oil by adding an equal amount of nitric acid (Sp. Gr. 1.40), and some copper turnings. The elaidin produced by the pure oil was more firm and coher-

ent than that of the adulterated oil and was of a lighter color; also the nitrous fumes rose more rapidly through the pure oil. One curious fact noticed about the adulterated lard oil was, it could not be completely saponified with caustic soda; even when the latter was added in excess a clear layer of unsaponified oil remained after several trials. This test clearly indicated adulteration, as pure lard oil will completely saponify with caustic soda. Prof. Allen has proved that shark liver oil and African fish oil resist saponification. He tried to saponify the former oil with aqueous potash, with a solution of potash in absolute alchohol, and by heating it with solid potash, but it would not completely saponify, this he thinks is due to the fact that it contains a body allied to cholesterin, but fluid at ordinary temperatures.

Pure lard oil gives with nitric acid of Sp. Gr. 1.33 a yellow color approaching orange.

The adulterated sample of lard oil with nitric acid of the same strength gave a distinct brown color on standing. That portion of the oil which resisted saponification with caustic soda was treated with nitric acid, and it soon became of a deep coffee brown color, much darker than the above.

The determination of specific gravity is the most important of the physical tests. The viscosity of an oil is a highly important feature, but in order to be of any value in testing much care must be observed; both oils must be brought to the same temperature and kept so while flowing. Both the adulterated and the pure lard oil were subjected to this test, they were brought to a temperature of 80° F. and 5 c. c. of each oil was passed through a capillary tube. The pure oil required 960 seconds to pass through, while the adulterated oil required 1080 seconds. The experiment was repeated several times with different tubes, but the ratio of the times of flowing was constant. Both oils were subjected to a temperature of 32° F. When the pure oil was frozen it was more coherent and firm and much lighter in color; the adulterated sample was quite yellow. When the adulterated oil slowly became liquid a layer of yellow oil formed first, which was quite different in appearance from the other portion and was evidently the adulterant.

While we cannot depend on any single test, the evidence afforded by several is often conclusive and satisfactory, and in this case it was acknowledged afterwards that cotton seed oil was one of the adulterants.

THE ARUBA LANGUAGE AND THE PAPIAMENTO JARGON.

By Alb. S. Gatschet, Washington, D. C.

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Aruba is the westernmost isle of the group of islands which extends from east to west along the northern coast of South America at a short distance from the mainland. It lies north of the peninsula of Para-